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ST. PAUL, MINNESOTA
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Use Of Bulk Tank Cultures In Problem Solving And Herd Monitoring

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The use of bulk tank cultures has become somewhat commonplace in recent years. It is a useful technique for determining the general types of bacteria present in cows within the herd, as well as determining the amount of exposure to environmental bacteria, which is occurring. Bulk tank culture procedures are certainly not a stand alone type test, and in most instances need to be supplemented with individual cow somatic cell counts and in some cases with individual cow cultures. However, it is a relatively rapid, inexpensive way to determine some types of information when trying to "troubleshoot" problems in a dairy herd or for monitoring environmental exposure.

Sample Collection and Handling

The number of samples used varies but there is strong evidence that in some instances, especially in small herds, that multiple samples collected over several days produce more consistent results. Early in the development of this procedure, it was shown that four days milk is probably needed to overcome the variability in shedding which occurs with some organisms. It also gives coverage over a number of milkings, and also to some extent environmental conditions. Samples need to be carefully taken from the top of the tank since bacterial growth tends to occur around the outlet valve. If a sample must be taken from the bottom of the tank, a fairly large quantity of milk should be allowed to flow through the opening before the sample is taken.

The samples should be frozen immediately and kept frozen until they arrive at the laboratory. A sample which, thaws and warms is of virtually no value. Shipping the sample to a diagnostic laboratory needs to be done in an insulated container containing a sufficient amount of ice type material to allow the sample to arrive at least partially frozen.

Interpretation of Results

It must be remembered that bulk tank cultures are basically estimates and may vary from time to time. As mentioned earlier, they are not a stand alone type of procedure.

An understanding of where the organisms originate and how they affect the mastitis process is helpful in planning mastitis control programs. The organisms *Streptococcus agalactia* (Staph ag) and *Staphylococcus aureus* (Staph aureus) in a bulk milk sample can be assumed to have originated from infected cows if the sample has been handled properly to eliminate the possibility of growth.

The significance of the numbers of these organisms cannot be over interpreted since there is a tendency for the amount of shedding to vary considerably. In general, there is an 85-90% correlation with bulk tank cultures and the numbers of cows infected. However, in 10-15% of

the cases, there is not a general correlation. Therefore, determining the numbers of infected cows from DHIA counts or individual cultures will be needed to determine the true significance. However, it can be looked at as an indication that further examination is needed.

Perhaps one of the more useful aspects of bulk tank culturing is to determine the degree of environmental exposure. Environmental organisms such as the environmental strep, coliform, and staph, which are obtained in a bulk tank culture, can be assumed to have originated on the teats of cows. Therefore, it is not a direct measure of infection but a measure of potential for infection since we know that the more these organisms are present on the teat skin, the higher the potential for infection. This is particularly true with environmental strep and coliforms. Monitoring the numbers of these organisms can be used to determine potentials for infection due to weather changes, management changes, milking practice changes, etc. This tool can be useful to evaluate the effects of changes on the potential for environmental mastitis possibilities.

Long term observations suggest that the levels shown in the tables tend to be reasonably accurate. In addition, observations have shown that when the level of environmental organisms in bulk tank cultures, especially strep or coliforms are above the normal levels, we can expect an increase in clinical mastitis resulting from infections with these organisms.

Bulk tank cultures also provide a fairly direct assessment of factors such as milking practices. Though it may appear that the cow preparation procedure is resulting in clean cows, if elevated numbers of environmental bacteria are present, there is a hole in the procedure somewhere and there is still a mechanism for these organisms to result in increased infection rates.

The number of environmental (coagulase negative) staph also tends to be related to the number of organisms on the teat skin. This observation has suggested that this relates, to some extent, to the efficacy and particularly coverage of teat dip. In general, if teat dipping is not being practiced or coverage is not good, environmental staph will be present in higher numbers.

The way in which bulk tank interpretations are used needs to be carefully considered. Finding large numbers of environmental organisms suggests that a careful evaluation of stall maintenance and milking preparation procedures is needed to determine the source of these organisms. High numbers of contagious organisms suggests that it may be desirable to do individual cultures to find which cows are causing the problems and deal with them appropriately.

As mentioned, bulk tank culture is not a stand-alone technique, and can be used more for pointing out those areas, which need further examination. It also needs to be emphasized that laboratory procedures are not perfect. If laboratory procedures do not agree with other observations such as herd history and somatic cell count patterns, a careful assessment needs to be made and a possibility considered that laboratory results may not be correct due to improper sampling, sample thawing or handling or an overgrowth of environmental organisms. In this case, repeating a bulk tank culture at a different point in time should help eliminate this possibility.

Bacteria Counts

Type of Bacteria	Your Results	LOW levels	MODERATE levels	HIGH levels	VERY HIGH levels
Strep. ag.	_____	< 50	50 - 200	200 - 400	> 400
Staph. aureus	_____	< 50	50 - 150	150 - 250	> 250
Non - ag Strep.	_____	500 - 700	700 - 1200	1200 - 2000	> 2000
Coliforms	_____	< 100	100 - 400	400 - 700	> 700
Staph. epi. species (coag. neg.)	_____	< 300	300 - 500	500 - 750	> 750

The **above table** is intended to aid in interpreting your bulk tank sample results. If your results fall within LOW levels, you are probably doing a good job controlling mastitis. However, if your results are higher you may want to reconsider the effectiveness of your current mastitis control procedures.

The **table below** lists each bacterial type with it's corresponding source of infection, means of spread, and suggested control measures.

Type of Bacteria	Usual Source of Infection	Major Means of Spread	Mastitis Control Measures to be Improved
Strep. ag.	infected udders of other cows in herd	cow-to-cow by contaminated udder wash rag, teat cups, etc.	use separate towels to wash/dry; teat dipping; dry cow treatment; eradication in special cases
Staph. aureus	infected udder & contaminated bedding, etc.	cow-to-cow by contaminated udder wash rag, milking equipment or inadequate milking equipment	use separate towels to wash/dry; teat dipping; dry cow treatment; culling of chronically infected cow; establish milking order
non-ag Strep.	environment of cow	environment to cow by: wet, dirty lots, milking wet cows, poor cow milk prep, machine problems (reverse flow at teat), wet dirty bedding	improve barn & lot sanitation; dry cows; avoid air leaks & liner slips; change bedding frequently
Coliforms	environment of cow	environment to cow by: wet, dirty lots, milking wet cows, poor cow dry cows preparation, machine problems resulting in reverse flow at teat end, teat injuries, hot humid weather, wet dirty bedding	improve barn and lot sanitation; milk clean after milking; keep cows standing 1-2 hours after milking; avoid air leaks and liner slips; change bedding frequently
Staph. epi.	normal inhabitants of skin, some bedding	poor teat dip coverage, poor cow preparation; old bedding	teat dipping, adequate cow prep, more frequent bedding changes